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[...als with the economic uses of Forest products, and is edited ... Thurston, now officiating as Reporter on Economic Products ... vernment of India.]

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OF

THE INDIAN FORESTER.

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[This product is described in Dr. Watt's Dictionary of Economic Products, Vol. IV., I, 62—68.]

INDIA-RUBBER
FROM
FICUS ELASTICA.

The main object of this hand-book is to draw attention to the commercial importance of the rubber tracts of Burma and Assam.

INTRODUCTORY.

Ficus elastica is "a large evergreen tree, usually epiphytic in its young stage, but finally or originally rooting in the ground and sending down aerial roots from its branches. It is found in the damp forests at the base of the Sikkim Himálaya and eastward to Assam, Chittagong, and Burma." (*Dict. Ec. Prod.*) In the rubber tracts of Upper Burma it is scattered singly or in small groups in dense evergreen forest, the average number of trees being nine per hundred acres.

The habits of the tree are well described by Mr. G. Mann, Conservator of Forests, in a note on 'How rubber-trees are grown in Assam' (1892), * from which the following extract is taken: "The seed of *Ficus elastica*, where the tree grows naturally in the forests, germinates almost invariably in the forks of trees, 30 to 40 feet and more above the surface of the ground, and the young trees grow in consequence for some 6 to 10 years as epiphytes, after which the aerial roots reach the ground and increase rapidly in size, until some of them reach a girth of from 4 to 6 feet. They are very numerous, and it is not uncommon at a later age that they are thrown out also from the upper branches 60 to 80 feet from the ground, being first as thin as whip-cords, but very soon increasing in size after they have reached the ground. It thus frequently happens that the tree on which the young rubber seedling first germinated is killed by the more vigorous-growing *Ficus elastica*, which, in this respect, resembles the well-known Banyan tree, and is one of the largest growing trees of the mixed forests in Assam. It requires an exceedingly damp atmosphere to do well, and therefore thrives best at the foot of the mountains, or on the mountains themselves up to an elevation of 2,000 feet. It is met with also at a higher elevation, but there it is not so vigourous, and at 5,000 feet it is liable to be injured or killed by frost."

The earliest writer on the caoutchouc of *Ficus elastica* was the late Dr. Roxburgh, whose attention was directed to the rubber on a vessel containing honey sent to him from Sylhet. He described the plant that yielded the Sylhet elastic water-proofing gum in the 5th volume of the 'Asiatick Researches,' but his remarks in his subsequent 'Flora Indica' contain the main facts, and as being of historic interest, may be here quoted:

* Kew Bul. Ap., 1891.

"Towards the close of 1810, Mr. Matthew Richard Smith of Sylhet sent me a vessel, there called a *turong*, filled with honey in the very state in which it had been brought from the Pundua or Juntipoor mountains north of Sylhet. Mr. Smith observed that the inside of the vessel was smeared over with the juice of a tree which grows on the mountains. I was therefore more anxious to examine the nature of this lining than the quality of the honey. The *turong* was therefore emptied and washed out, when to my gratification I found it very perfectly lined with a thin coat of caoutchouc."

At the present day India-rubber is the most valuable minor forest product of Assam. In 1873 the first commencement of the present Charduar rubber plantation, which has since been regularly extended, was made with a view to providing for the future supply of rubber.

The trade in India-rubber in Upper Burma was first brought to the notice of Government in 1870, and its export to the Lower Provinces commenced in 1873, when the monopoly was leased under the Burmese King to Chinese firms. After the occupation of Upper Burma we continued the monopoly system up to October, 1888, the license being sold for R1,00,000. The trade was then thrown open to everybody who took out a license on payment of 8 annas a viss (3½ lb) duty at Bhamo.

In a recent report on the trade in the Mogaung sub-division of the Bhamo district, from which all the rubber brought down to Bhamo comes, Mr. O'Bryen, Assistant Conservator of Forests, states that the rubber extracted is of two kinds, obtained from two trees, one of which is *Ficus elastica*, and the other is supposed to be *Ficus laccifera*=(*F. altissima*, Blume), and that the rubber from *F. elastica* soon hardens on exposure to the air (generally in two or three hours), and is of a red colour, while that from *F. laccifera* (which is of small commercial value and not much worked) is black and never hardens properly, being always more or less viscous. In a further report Mr. O'Bryen refers to adulteration with the rubber of *Ficus religiosa* (the Peepul).

PROPAGATION OF FICUS ELASTICA.

In the note quoted above Mr Mann states that, "the seed ripens from January to March, when it is collected as it falls off the trees, and afterwards dried in the sun.

"It is, properly speaking, the fruit, and consists of small figs, the size of a pea. These at the time of sowing are broken between the hands, and the seed thus mixed with the particles of the fruit is sown without any attempt to clean or separate the seed.

"Germination takes place sometimes only three months after the seed has been sown, and, as it is very small, it must be sown on the *surface* of the soil only, but otherwise just like the seed of any other plants. It requires as much light as possible from above; side shade is an advantage. The seed can be sown on beds, or in boxes or flower pots, but it is most essential that the drainage of the soil be perfect, and that the earth never becomes soaking wet, whilst, on the other hand, it should never be allowed to become thoroughly dry, but always be kept moist.

"As the seedlings are very small at first, they must be treated with great care, and drip from trees above the seed bed must be guarded against; the soil must be kept loose, and open vegetable mould is the best soil.

"When the seedlings are 2-3 inches high, they have formed already a little thickened root something like a small carrot, and can then be transplanted very safely: this should be done on to a properly dug nursery bed, *well drained*, and the seedlings should there be placed about one foot in lines also a foot from each other.

"After the seedlings have become 1-2 feet in height they are very hardy, and can be transplanted at any time of the year, but as the deer are very much after the leaves of the rubber trees, and to avoid the great expense of fencing in our plantation, we have of late years transplanted the young trees a second time in nurseries giving them more room, say, 3-4 feet square each plant, and let them grow until 10 to 12 feet high, when they can be put out into the plantation without fear that the deer will destroy them; they require, however, a strong stake each, as the deer will bend the young trees down with their horns, if not staked.

"Seedlings of *Ficus elastica* planted in the forks of trees in the forest are very difficult to attend to, and they in consequence often become dry about their roots, which retards their growth, if it does not kill them; for these reasons the rubber trees planted on the ground have grown much better in the Assam plantations, and the latter mode of planting has therefore been adopted almost exclusively; they are not planted, however, on the ground in the common way, but on small mounds, 3 to 4 feet high, of earth, and the cut-wood and rubbish close at hand, which suits the epiphytal habit of growth of this tree.

"These rubber trees can also readily be propagated from cuttings, if only perfectly ripe young branches or shoots are used; but young trees so raised are never so hardy as the seedlings, and do not make equally good growth afterwards.

"To ensure the greatest possible amount of moisture in the atmosphere, the plantations of *Ficus elastica* in Assam have been made in the moist evergreen forests near the foot of the hills, through which lines 40 feet in width were cleared 100 feet apart from centre to centre of the lines, thus leaving 60 feet of forest standing between the lines. On these cleared lines the mounds for the planting of the seedlings or saplings are thrown up at distances of 25 feet apart. Care has to be taken afterwards to prevent the forest trees left standing closing in above, over the lines and the rubber trees planted on them, which they have always a tendency to do, and which, if not guarded against, is very detrimental to the growth of the young rubber trees. This is easily effected by lopping the branches of the forest trees left standing. The undergrowth which springs up on these lines, and, as a rule, grows most vigorously, has to be also cleared two or three times in the year for the first four or five years, to admit air for the young rubber trees; but beyond this, and the putting occasionally some more earth on to the mounds on which the trees were planted, nothing is necessary.

"The lines for the planting are cut in an east and west direction, so as to protect the young rubber trees against the strong sun in the middle of the day; the atmosphere also keeps moister in this case than if the lines were cut south and north."

"High ground is always best, and swampy ground, where water lodges, should be avoided; but the tree grows very well on alluvial flats, on the banks of rivers, even though the land be inundated for a few days once or twice in the year."

In 1890, the following memorandum on the methods employed in cultivating the *Ficus elastica* tree in Malabar, was drawn up by Colonel Campbell Walker, Conservator of Forests, Madras, in connection with the proposed cultivation of the tree at Lagos (on the West Coast of Africa):—

"The method of sowing is as follows:—

"A seed bed, 10 feet long × 2½ feet broad, should be prepared. The soil should first be well forked over to a depth of at least 18 inches, well pulverised and mixed with sifted stable manure (old), ashes and sand. The proportion of mould, sand, ashes and manure should be as follows: one of mould, two of sand, one of ashes, one of manure. All these materials should be sifted through a wire-gauze sieve.

"The bed should be raised 4 inches above the ground, and the surface made perfectly level and smooth.

"On the top of this layer 1 inch in thickness of stable manure and river sand, in equal proportions, should be sifted, and over that a layer ¼ inch in thickness of brick or tile dust also sifted. The dried fruit should now be rubbed to powder between the hands, and then sifted and sown thickly over the brick dust After sowing the seed, a flat, smooth piece of board should be gently pressed all over the bed, the surface of which should in this manner be made as level and smooth as the surface of a billiard table.

"The bed having been prepared and seed sown, it should be watered A small garden engine should be stationed close to the bed, and a very fine spray must be allowed to fall gently over the bed till it is well moistened. This can be done by placing the thumb of the left hand over the muzzle of the delivery pipe of the engine. It is essential that none of the seed, which all lies on the surface, should be washed away. A sheet of galvanised iron, or any efficient substitute, should now be placed about 6 inches above the bed, so that no rain water may fall upon or injure the surface of the bed, which must be kept always *damp*, and in dry weather three or even four waterings a day may be necessary.

"In about ten days the young seed should germinate freely, and it will be necessary to admit sun-light from 3 to 6 hours daily.

"In cloudy weather the young plants may be exposed freely all day, and a *very* light drizzle will not hurt them; but, if the upper surface of the bed is once allowed to dry, or is broken up by the heavy rain, the young plants will perish. The gardener in charge, who should be a trustworthy man, should be directed to remove the covering of the bed morning and evening, and give the young plants a free allowance of sunshine daily.

"Several nursery beds should now be prepared. They should be heavily manured, and 4 inches of the surface made of sifted soil As in the case of the seed bed, a ⅛ inch sifted brick or tile dust will be found necessary. Into these nursery beds delicate young seedlings should be carefully pricked out 1 foot apart, with a porcupine quill or a strip of bamboo, when ⅛ inch in height.

"In these nursery beds the young plants should remain till 3 feet high, and then be planted and permanently from 40 to 60 feet apart in pits 3 feet × 3 feet."

SYSTEM OF TAPPING, AND YIELD.

In 1869 Mr. C. Brownlow started on a journey up the valley of the Jatinga in Cachar, with the object of studying, among other things, the India-rubber of that neighhourhood, and from his account of his journey* the following note is taken:—

"The roots that are tapped are the aerial roots It is only necessary to see the tree to appreciate the fearful risk encountered by the gum-gatherers, who by no means confine their operations to the base, but climb up as high as the roots extend, and higher along the horizontal branches, chopping with their *dhaus* at intervals of every few inches, the cuts answering as well for their foot-hold as for the sap to exude from. . . .Were the base of the tree alone tapped, the yield would be very insignificant, especially in trees that have been frequently tapped before, and as the trees occur very sparsely, and long distances have to be gone over to meet them, it becomes an object to get as much off at each cutting as possible. The tree must be twice climbed, once to cut it, and a second time, after the gum has dried (which takes a day or two), to gather it. This is done by pulling off the tear which gathers below the wound, which brings away with it all the gum that has

* Journ. Ag.-Hort. Soc. Ind., New Ser., Vol. I, 311.

exuded, and these tears have only to be moulded together to agglutinate into a ball. The quantity that can be collected at one cutting does not exceed 4 to 5 seers (8 to 10lb) Of course no mercy is shown to the trees, all of which (at least those that I saw) suffer severely; many, I was assured, are killed outright. The damage they sustain is evident in the large cankers, and buttresses rotted off, owing to the bark being unable to heal over the frequent wounds they have received all round. The foliage is wanting in luxuriance, and dried branches and roots lying about testify to the injury in health that the tree has sustained. . . . Of course the only season in which the gathering is practicable is the dry-months; during the rains the tears would be washed away before they had time to solidify."

In a report published in 1869,* Mr. Mann, Conservator of Forests, Assam, affirmed that continuous tapping year after year will kill the trees and insisted on the following points being observed:—

1. Fresh cuts to be made only in February, March, and April, and the trees to have rest for two years between each tapping.
2. The cuts to be at least 18 inches apart, and to penetrate into the bark only, not into the wood. (Mr. Mann preferred the German scoring knife)
3. As far as possible the milk to be collected in a fluid state in narrow-mouthed rattan baskets, and to be brought to central manufactories.
4. Endeavours to be made to convert the milk into a solid state by a process of slow drying similar to that practised in Pará.
5. Those varieties of caoutchouc which dry naturally on the tree to be collected with care, and to be picked so as to get rid of all impurities.

As regards the system of tapping in Burma, Mr. O'Bryen, in the report already quoted, states that in the Mogaung sub-division of the Bhamo district, the rubber forests of which are under the control of Kachin Sawbwas, who employ their tribesmen to collect the rubber and sell it to Chinese traders, the method of extracting the rubber is as follows:—

"Beginning in September and October, the Kachins visit the trees, and make irregular-shaped *da*-cuts at unequal intervals all over the stems and larger branches. These cuts are made with one stroke of the *da* at intervals of about a foot. The juice exudes from these cuts and runs down the stem, adhering to the bark, hardening and getting red in a few hours. These strips are then torn off by the men, and rolled up into balls of from 3 to 9 inches in diameter, weighing from 1 to 4lb. The stems are worked first, and later on the larger branches. They do not generally tap a branch unless it is 9 inches in diameter, as the juice that exudes from the younger shoots becomes mingled with the sap, which prevents its hardening properly. From a previously untapped tree of large size as much as 70 ticals† may be got from one *da*-cut, but, as a rule, about 20 ticals are exuded. From a fairly large tree they get 60 viss (219lb), and as much as 100 viss (365lb) has been procured from some the first year they are tapped. The collection continues to about the middle or end of May, in fact to the commencement of the rains. The tree is then allowed to rest until the following season. The trees are cut every year as long as they will yield any appreciable quantity, but in the Indaw forests, the export from which has diminished considerably of late years, I saw signs of a certain periodicity. . . . In this region, at all events, the Kachins seem to have learnt that it is possible to overtap the trees, and are afraid of losing what to them must have been a large source of profit. Even now they are not content with tapping the stem and branches, but they follow up the larger horizontal surface roots and tap every 6 feet or so. They do this by digging a small pocket in the

* Rep For. Adm., Bengal, 1868-69; reprinted in Journ. Ag.-Hort. Soc. Ind., New series.

† A tical = 180 grains.

earth at the place they intend cutting, lining it with dry leaves, and then track almost through the root with their *dás*, always leaving on the underside a small portion of bark uncut. The production of the Indaw forests is estimated to have decreased one-half in the last two years. In the Amber Mines, I am told, especially near Luban and the easier export routes, the trees are almost valueless, as they are completely exhausted through over-tapping, they are, however, said not to be dead. Every year the rubber is brought from greater distances inland, and the limit seems not to have been yet reached ....I do not think there is very much chance of an early failure of the rubber trade, as from what I can gather the area worked so far is very small with the total available, as the rubber tree is said to extend for 400 or 500 miles north of Kamaing both east and west."

In a further note Mr. O'Bryen states with reference to the yield of rubber that "the quantity of rubber obtainable will depend on the size of the tree, and also on the number of times it has been previously tapped. A large tree with three or four stems and a well-developed crown will yield the first year it is tapped 60 to 70 viss (210 to 245lb); if tapped again the next year (the Kachins invariably tap a new tree three years successively), its yield will fall off to 40 viss (140lb); and the third year not more than 15 to 20 viss (or 52 to 70lb) are obtainable; the fourth year it would yield nothing. If after having been tapped for three years successively, it be allowed to rest for a couple of years, perhaps 25 viss may be obtained; but by the three successive tappings the vitality of the tree is permanently injured. This impaired vitality is shown by a falling off in the size of the leaves which instead of a length of 5 or 6 inches, are only a couple of inches long; by the paucity of leaves in the crown; by the dying of the uppermost branches; and by the inability of the tree to recover the places where the incisions were made. This latter sign is specially noticeable where the roots have been tapped, as the wood is deeply cut into. The wood of *Ficus elastica* is white and extremely soft, and liable to decomposition; consequently, if the wounds are not quickly covered over, rot sets in, and progresses with astonishing rapidity up and down the stem, and in a very short time the tree is smashed off in a gale of wind.

"As is well known, the quantity of rubber produced by two equal-sized trees—one on the hills and one in the plains—is not to be compared. The flow of juice from the tree in the plains is abundant in quantity, but produces very little rubber on hardening. The tree grown on the hills has very little water in the juice that runs out. The Kachins have long ago recognized this fact. Generally speaking, it is safe to say that the quantity of rubber yielded by the tracts which are easily got at is falling off considerably, and will continue to do so, unless severe measures are taken to preserve the trees.

"The more remote districts are protected purely and simply by their remoteness, and, as the exploitation is being pushed further and further every year, these tracts will tend to become exhausted as the demand increases. The rules at present in force are sufficient to protect the trees, if enforced, but at present we have no means of enforcing them in the Amber Mines, the most important of the rubber tracts. In the Amber Mines the time of cutting is prolonged to the rains. What effect this has on the tree I am not prepared to say.

"The length and breadth of the cut made does not generally exceed 1 foot in length and 4 inches in breadth. The distance between the cuts as laid down by the rules is also about the distance observed in practice. The tapping of the roots is carried on to a lamentable extent. In the Amber Mines the general practice is only to tap the roots above ground at the foot of the stem. This also must be put a stop to, but it is not nearly so harmful as the practice of cutting the underground roots. I would suggest that the

following addition be made to the rules regarding the tapping of rubber trees —

"That no person shall tap the main stem or aerial roots of the rubber tree when they have a less girth than 3 feet at 3 feet from the ground

"At present a young seedling throws down an aerial root, which is tapped as soon as it reaches the ground This must necessarily interfere with the growth of the tree, and prevent its reaching its full development

"*Ficus elastica* is a very rapid grower, and the aerial roots would attain the girth mentioned in six or seven years"

LEGISLATION

In the Progress Report of Forest Administration in Assam, 1891 92, it is stated that "the right to collect the product has been farmed out to contractors, who have hitherto paid considerable sums of money for the privilege Lately, however, many complaints have been made that the Assam forests are not nearly so productive in rubber as heretofore, a fact doubtless owing partly to the reckless method of working employed by the contractors and their agents, and partly to the unprotected and inaccessible situations of the rubber tracts, which have enabled the adjoining hill tribes to illicitly tap the trees and import the rubber into Assam free of duty as foreign produce A report has been received from the Divisional Officer of Darrang, describing how he has just found the Government forests on the frontier full of foreign rubber tappers who have come down in a systematic way, in separate gangs, each under a *Sardar*, and heavily tapped nearly all the trees growing within a few miles of the border, the work being done at night"

The question of levying a duty on rubber imported into Assam from beyond the frontier was raised as far back as 1879, but the scheme suggested by Mr (now Sir) D Brandis, Inspector General of Forests, for levying a duty on foreign rubber was abandoned, it being understood that it had been arranged as an experimental measure to put up to auction sale the rubber mahals in those parts of the province where the article is most largely produced, and that steps would also be taken for protecting rubber in certain defined areas with a view to placing Government in a position hereafter to supply rubber from its own forests if necessary

In 1889 Mr Ribbentrop, Inspector General of Forests, drew attention, among other things, to the fact that, while the prices fetched at the sales of the Assam rubber mahals were probably enhanced by the mahaldars receiving passes to proceed beyond the Inner Line (so as to tap trees or purchase rubber in foreign territory by private arrangement with the hill tribes) this measure, owing to the whole business being in the hands of the Marwaris, did not bring the bidding up to one third of the actual value of the monopoly. Mr Ribbentrop further drew attention to the fact that a duty of R12 a maund was being levied by Government in Upper Burma, to avoid which large quantities of rubber entered Assam from that country in consequence of no duty being levied here on foreign rubber He accordingly recommended that a uniform rate of royalty and duty should be imposed on all rubber produced in Assam or imported from beyond the frontier, and that the rate should be assimilated to that levied in Upper Burma; the levy of this tax to take the place of the sale of monopolies, *i e*, of the mahal system, which threw the lion's share of the profits into the hands of the capitalists.

In November, 1892, the following rules were made by the Chief Commissioner of Assam for regulating the collection and removal of India rubber being the produce of trees on land at the disposal of Government, and not included in a reserved or village forest, within the territories under his administration

1 India rubber trees growing on any such land may be tapped only during the months of December, January February, and March The roots of the

trees and the lowest part of the stem within 3 feet from the surface of the ground may not be tapped, and no India-rubber trees may be felled, burnt, or tapped The incisions must be not less than 2 feet apart, and must not exceed 1 foot in length and 4 inches in breadth.

2 No person shall extract, collect, or remove India-rubber, being the produce of trees on any such land, save under, and subject to, the conditions of an India-rubber-collecting license granted by the Local Government, or by the Deputy Commissioner or the Forest Officer in charge of a division, or other Forest Officer empowered in this behalf...

3 No person shall purchase any India rubber, being the produce of trees on any such land save under, and subject to, the conditions of an India rubber-purchase license granted by the Local Government or by the Deputy Commissioner or the Forest Officer in charge of a division, or other Forest Officer empowered in this behalf .....

4 A duty at the rate of R12 per maund of 40 seers (80lb) shall be paid on all India-rubber extracted from trees growing on any such land, and shall be levied at the first revenue station reached by such India rubber.

5 Any person committing a breach of any of the foregoing rules shall be punishable with imprisonment for a term which may extend to six months, or with a fine which may extend to five hundred rupees, or with both

With reference to the above rules the Conservator of Forests, Upper Burma, pointed out, in 1891, that, though they would be difficult to enforce, the India-rubber trees in his circle would be very soon destroyed unless some similar rules for their preservation were enforced.

In August, 1892, the following rule was accordingly passed for the tapping of India-rubber trees in the Bhamó and Upper Chindwin districts : -

Trees may be tapped only during the months of December, January, February, and March Stems or aerial roots measuring less than 3 feet in girth at 3 feet above the ground, as well as the underground roots of trees and the lowest part of the stem, within 3 feet from the ground, may not be tapped, and no India-rubber trees may be felled, burnt, or tapped The incisions must not exceed 1 foot in length and 4 inches in breadth

TRADE.

(*a*) ASSAM.

The following statement shows the receipts that were realised from India-rubber during the five years, 1887 to 1892 :—

NAME OF DIVISION.	1887-88	1888-89	1889-90	1890-91.	1891-92
	R.	R	R	R	R
Cachar	275				
Sylhet	500				
Kámrup	300	100			..
Darrang	21,005	21,005	21,005	21,005	1,005
Newgong	69			.	...
Lakhimpur	10,600	10600	10,600	*	4,000
Naga Hills	..	517	517	517	270
Khási Hills	515	860	855	700	310
TOTAL	33,264	33,082	32,977	22,222	25,585

* No rubber *mahals* were sold in the Lakhimpur division during 1890-91. The price offered was R20,000 for five years, which was considered too low

The calculated outturn of India-rubber in Assam during the same years was :—

	1887-88.	1888-89.	1889-90.	1890-91.	1891-92.
Quantity in maunds * . . .	6,563	6,675	3,419	3,076	4,227

* A maund=82lb

The following table shows the quantity and value of the India-rubber exported from India to foreign countries during the six years, 1887 to 1893 :—

YEAR.	Cwt.	R
1887-88	9,228	1,154,335
1888-89	8,673	967,348
1889-90	9,934	1,137,498
1890-91	9,292	1,173,175
1891-92	9,334	1,172,370
1892-93	9,972	1,307,819

The distribution of the India-rubber to different countries during the corresponding years was as follows :—

Country.	1887-88.		1888-89.		1889-90.		1890-91.		1891-92.		1892-93.	
	Cwt.	R	Cwt.	R	Cwt.	R	Cwt.	R	Cwt.	R	Cwt.	R
United Kingdom .	7,037	8,55,964	5,886	6,47,896	5,840	6,31,045	7,497	9,46,295	7,403	9,15,949	7,712	10,23,119
United States . .	1,902	2,61,541	1,670	2,06,394	2,110	2,86,258	1,384	1,89,761	1,414	1,95,143	1,989	2,55,520
Egypt . . .	...	...	906	87,550	1,938	2,15,700	375	34,456	162	20,500	...	...
Straits Settlements .	13	394	134	15,991	24	2,510	36	2,663	313	35,360	196	22,600
Germany . .	202	26,561	77	9,517	...	...	...	...	42	5,418	53	6,280
China, Hong-Kong	15	1,050	...	...	...	...	...	...	...	...	22	300
Holland . . .	...	...	...	...	15	1,700	...	...	...	...	...	...
Italy . . .	59	8,825	...	...	...	...	...	...	...	...	...	...
Other Countries .	...	...	...	...	7	285	...	...	...	...	...	...
Total .	9,228	11,54,335	8,673	9,67,348	9,934	11,37,498	9,292	11,73,175	9,334	11,72,370	9,972	13,07,819

The share taken by Bengal (Assam produce) and Burma (Burma produce) in the export of the above from 1887 to 1892 was as follows:

Year.	Bengal.		Burma.	
	Cwt.	R	Cwt.	R
1887-88	6,251	6,97,654	2,977	4,56,681
1888-89	5,609	6,09,195	3,064	3,58,153
1889-90	4,511	5,34,584	5,423	6,02,914
1890-91	4,[illegible]85	5,15,986	5,107	6,57,189
1891-92	3,563	4,60,786	5,771	7,11,584

The decline of the export from Bengal, and increasing value of the export from Burma are very markedly indicated.

Commenting on the decline of the exports of India-rubber from Bengal in 1887-88, the Collector of Sea Customs, Calcutta, stated, in the Annual Statement of the Sea-borne Trade and Navigation of Bengal, that, "It is a pity that something cannot be done to improve the method of collecting Indian caoutchouc, which at present does not command in Europe and America as high prices as that from other countries. It would seem probable that, with proper care and more attention to the extraction of caoutchouc according to methods adopted in the places which supply the best description, the value of the trade to India would materially increase. I understand that the inferiority of the Indian article as exported is not due to the intrinsic inferiority of the trees in Assam, but to the careless way in which the caoutchouc is collected, and to its so coming into the market full of extraneous matter" This extraneous matter is said to consist of pieces of bark, wood, mud, sand, and stones.

(b) Burma.

The receipts realised from India-rubber during the five years, 1887 to 1892, are shown in the following table:—

Division.	1887-88.	1888-89.	1889-90.	1890-91.	1891-92.
	R	R	R	R	R
Bhamo	...	11,717	78,799	1,04,497	1,07,364
Chindwin	75*	2,966	3,747	4,179	10,963
Minbu	...	...	...	2	16
Total	75	14,683	82,546	1,08,678	1,18,343

* Small outturn due to the disturbed state of the country.

In the time of the Burmese Government, the right of purchasing India-rubber from the Kachins was sold to one person or firm, and besides the monopolists no one else was allowed to bring down India-rubber from Mogaung This plan was continued till the year 1888, when the monopoly system was abolished, and the trade thrown open to all who wished to take out licenses to pay a royalty of 8 annas a viss (3·65lb).

In his report on the Rubber trade in the Mogaung sub-division of the Bhamo district, 1891, Mr. O'Bryen states that "the mechanism of collecting and exporting the rubber varies slightly in detail in the two tracts of which I have any knowledge, but is practically the same everywhere. The Kachin Sawbwas lay claim to the trees found within the limits of their jurisdiction, and work them either with their own men or with imported Shan Tayok coolies. The rubber is then collected, and sold to the agents of the various Chinese firms, who have the whole trade in their hands. At the beginning of the season the Sawbwas receive large advances of money, gongs, cloths, etc., for working expenses, the Chinese recouping themselves and settling accounts as far as possible each year when the rubber is brought in. In the Amber Mines* district the Chinese deal direct with the Kachins, and keep up some 400 or 500 mules for the transport of the rubber to Luban village. On the Indian side, on the other hand, the Chinese employ Shan Burmans as intermediaries. They advance, say, R1,000 to a man whom they can trust on his note of hand, and repay themselves in rubber. In this way the whole responsibility and risk lie on the shoulders of the Burman, who makes his own bargain for the rubber with the Kachin, and then sells it to the Chinaman at the market rate, making from 10 to 20 per cent. Very often, however, the rubber changes hands two or three times before finally reaching the hands of the Chinamen. As a matter of fact, almost every man in the villages of Kamaing, Sakaw, and Lawson has something to do with the rubber. This latter system is rendered necessary by the small amount of rubber that is brought in by the different Kachin villages, which would render the system of direct advances to the Kachins both difficult and risky."

The following recent market reports are taken from *Capital*, a Calcutta weekly commercial publication :—

INDIA-RUBBER.

(*Season—November to July.*)

November 9th, 1892.—New season's production is not coming in, it is reported, pending settlement of Government duty.

January 4th, 1893.—Arrivals very meagre for the time of year. The recent imposition of R12 per Bengal maund duty has been the cause of the small arrivals this season.

January 25th, 1893.—The bulk of the purchases are being made for America, home shippers being unable to compete in rates.

February 8th, 1893.—It is reported that production this season is small, and that about 4,000 to 5,000 maunds will be the outturn against 10,000 maunds in other years. In Darjeeling districts, where the best quality comes from, production seems to be almost entirely neglected.

March 15th, 1893.—Supplies continue unusually small, and the demand for export to America continuing strong, prices have been fully maintained. Superior qualities have been realising fancy rates.

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* The quantity of rubber yielded by the Amber Mines tract is about nine-tenths of the whole supply brought from the Mogaung sub-division to Bhamo.

The rates have varied during the current season between the following limits:—

	R	R	
Darjeeling	85 to	122	per Bengal maund
Shillong	85 ,,	120 ,,	,, ,,
Goalpara	80 ,,	115 ,,	,, ,,
Tezpore	70 ,,	120 ,,	,, ,,
Lakhimpur	70 ,,	120 ,,	,, ,,
Dibrugarh	60 ,,	119 ,,	,, ,,
Sticky or Shippah	30 ,,	70 ,,	,, ,,

The price of Rangoon rubber during the present season (1893) has fluctuated from R430 to R455 per 100 viss (365lb), and is at present (May) declining. Only one description of rubber is known in the Rangoon market, and it is all classed as Rangoon rubber

The quotations of Assam and Burma rubber in the London market from April, 1892 to April, 1893 were:—

Assam, good to fine	1*s.* 6*d.* to 2*s* 3*d* per lb.
,, common, foul and middling	9*d.* to 1*s.* 6*d.* per lb.
Rangoon, fair to good, clean	1*s.* 5*d.* to 1*s.* 11*d.* per lb

During the same period Fine Pará rubber was quoted at prices varying from 2*s.* 8¾*d.* to 3*s.* 4½*d* per lb

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